DRAFT
Milwaukee River Estuary Walleye Management Plan

November 2004

Lake Michigan Fisheries Team
Bureau of Fisheries Management and Habitat Protection
Wisconsin Department of Natural Resources

Milwaukee River Estuary Walleye Management Plan

Prepared by

Fisheries Management and Habitat Protection
Southeast Region
Lake Michigan Work Unit

Approved

_____ _____
Gloria McCutcheon **date**
Regional Director – Southeast

_____ _____
Chip Krohn **date**
Water Leader – Southeast

_____ _____
Michael D. Staggs **date**
Bureau of Fisheries Management and Habitat Protection

TABLE OF CONTENTS

OVERVIEW

Introduction

This Milwaukee River Estuary Walleye Management Plan (Plan) will guide the management of the walleye fisheries in the Milwaukee River and Estuary. It was developed through a process designed to engage fisheries and law enforcement personnel working on Lake Michigan, the interested public and external partners.

The Plan presents an ambitious agenda of work that will test our energies and resources, and we realize that we may not achieve all of the proposed objectives or employ all of the proposed tactics. We realize that our scope for action may be limited by budgets and priorities established outside the Fisheries Management Program. The order of presentation of objectives and problems is not intended to reflect agency priorities.

As a framework for the Departments authority and guidance to manage fisheries in Wisconsin waters of Lake Michigan and its tributaries it is key to point out that we remain committed to the *Joint Strategic Plan for Management of Great Lakes Fisheries* (SGLFMP)[1]. This basin-wide management agreement was developed with assistance from the Great Lakes Fishery Commission. Wisconsin is a signatory to SGLFMP along with the seven other Great Lakes states, the Chippewa-Ottawa Treaty Fishery Management Authority[2], the Great Lakes Indian Fish and Wildlife Commission, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the Ontario Ministry of Natural Resources, and the Canada Department of Fisheries and Oceans. As a signatory, Wisconsin has agreed to a set of procedures for coordinating activities and resolving conflicts. Through SGLFMP, the Department accepts the following common goal for Great Lakes fishery agencies:

> *To secure fish communities, based on foundations of stable self-sustaining stocks supplemented by judicious plantings of hatchery-reared fish, and provide from these communities an optimum contribution of fish, fishing opportunities and associated benefits to meet needs identified by society for wholesome food, recreation, employment and income, and a healthy human environment.*

Pursuant to the Joint Strategic Plan, the Department works with the Michigan DNR, the Indiana DNR, the Illinois DNR, and the Chippewa-Ottawa Resource Authority to address issues of common concern on Lake Michigan. Lakewide fisheries management policies are developed by those five agencies through the Lake Michigan Committee. The LMC has adopted a set of Fish Community Objectives[3] to guide all five agencies in the management of Lake Michigan fisheries.

[1] Great Lakes Fishery Commission. 1997. A Joint Strategic Plan for Management of Great Lakes Fisheries.
[2] COTFMA has been re-constituted as CORA, the Chippewa-Ottawa Resource Authority, which is expected to become a signatory to the Joint Strategic Plan.
[3] Eshenroder, R.L., M.E. Holey, T.K. Gorenflo, and R.D. Clark, Jr. 1995. Fish Community Objectives for Lake Michigan. Great Lakes Fish. Comm. Spec. Pub 95-3. 56 pp.

Summary

This plan is presented in outline format, moving from broad objectives to specific tactics. Within each objective a statement is presented and then one or more problems are identified, and for each problem, one or more tactics are suggested. The tactics are too numerous to summarize here, but the following paragraphs capture the main features of the Plan. Much of this plan is taken directly from the Lake Michigan Integrated Fisheries Management Plan 2003 – 2013. To view this plan and other management documents please visit our website at **http://dnr.wi.gov/org/water/fhp/fish/lakemich/** and click on Management Reports. In addition, much of this new plan is a direct result from previous work and studies conducted on walleyes. An executive summary of the previous work can be read in Appendix A or read the full report titled "An Evaluation of Walleye Population Restoration Efforts in the Lower Milwaukee River and Harbor, Wisconsin, 1995-2003", PUB-FH-510-2004 on our website.

Protect, maintain, and enhance habitat for game and non-game fish species. Habitat for both native and introduced, game and non-game species is a high priority for the Department. Restoration and/or creation of habitat that will ensure the long-term sustainability of fish populations in the Milwaukee River Estuary is key to any rehabilitation plan. Tactics to address this habitat objective included habitat restoration and creation, non-point source pollution efforts, dam removal and stream classification systems.

Protect and restore native species. Because of habitat degradation and loss, native fish species that once flourished in the Milwaukee River Estuary have been extirpated or reduced to very low numbers. Stocking efforts to re-introduce these species remains a cornerstone for fisheries management when faced with these problems. Continued stocking of walleye for the next five years at levels comparable to the previous plan will help us achieve our restoration goal of naturally reproducing walleye in the estuary.

Maintain and develop fisheries assessments. In order to determine the population of walleye, young-of-the-year numbers and spawning population, fisheries assessments must be ongoing and new assessments developed where warranted. Tactics to achieve this objective are conducting a night time creel survey to better estimate the walleye harvest in the area combined with specific assessments on the walleye populations.

Maintain and enhance salmon and trout populations in Lake Michigan. The Department remains committed to judiciously stocking salmon and trout in tributaries and harbors of Lake Michigan and Green Bay including the Milwaukee River Estuary. Accurate harvest numbers of fish caught in the lake and tributaries is important along with insuring that adequate numbers of salmon and trout are stocked. Managing both cool and cold water species stockings is crucial to the success of both programs. These tactics include surveying habitat, assessing impacts of enhanced populations on other species, continuing to stock limited numbers of walleyes in the Milwaukee River and continuing to work with private groups to supplement rearing costs, deploy net pens, and meet other project needs.

Objective A. Protect, maintain, and enhance habitat for game and non-game fish species.

Although manipulation of fish populations is possible by a variety of techniques (e.g. fish stocking, regulation of harvest), ultimately an abundant, diverse, and stable fish community depends on the availability of suitable habitat for the desired species. By the broadest definition, suitable habitat includes those physical, chemical, and biological factors that are needed to satisfy the essential requirements of a species, allowing it to survive in an aquatic environment.

Human activity has altered fish habitats by filling or dredging wetlands and littoral areas, constructing solid piers, diverting and increasing runoff, decreasing base flow and changing drainage patterns in watersheds, releasing contaminants into the air and water, increasing nutrient loading, and releasing chemical pollutants. We must seek to protect undisturbed habitat, maintain functioning habitat, and, if possible, improve or create habitat beneficial to both game and non-game species.

Problem 1. Walleye, smallmouth bass, and northern pike spawning habitats are degraded or destroyed.

Urbanization and industrialization of the lower reaches of many major Lake Michigan tributaries have resulted in extensive filling of wetlands. Also, fills behind established bulkhead reduce shallow water habitat. Mitigating these losses with rock rip-rap appears to be one method of increasing walleye natural reproduction.

Tactic a) Evaluate the feasibility of enhancing walleye and northern pike spawning habitat in the Menomonee and Milwaukee Rivers.

Tactic b) Encourage research to determine factors limiting walleye reproduction in the Milwaukee River estuary, and develop strategies to improve reproduction.

Tactic c) Investigate the feasibility of concrete channel removal in the lower Menomonee River.

Tactic d) Restore/enhance walleye spawning habitat through the use of spawning shoals in the Milwaukee River estuary and spawning marshes in the Trinity Creek watershed.

Tactic e) Evaluate the effects of artificially high water temps (power plant discharge – Menomonee River) on walleye spawning activity.

Problem 2. Land use practices can lead to non-point source pollution affecting fish in our tributaries and estuaries.

While most people are familiar with the dramatic effects of point source pollution (e.g., direct discharge of untreated waste water into a stream or lake and resultant fish mortality), non-point source pollution has been largely overlooked in the past because it is not as conspicuous in its effects. Non-point source pollution can be the result of industrial or manufacturing processes, but also develops from land use practices related to construction, road-ditch maintenance, agriculture, and other activities. Improper land use can result in increased sediment, nutrient, organic-chemical and heavy-metal loadings to streams, while creating abnormal flow rates. All have negative effects on aquatic communities by destroying habitat, increasing turbidity, lowering dissolved oxygen levels, disrupting food webs, decreasing diversity, raising

stream temperatures, altering stream flow, and increasing the abundance of undesirable species.

Tactic a) Support efforts to help educate the public about effects of land use practices on water quality.

Tactic b) Develop specific land acquisition and protection goals related to fisheries habitat needs, for implementation by the Stewardship Program.

Tactic c) Provide information to external agencies and to the Department's Runoff Management Program to support programs that protect water quality and provide a diversity of habitats for fish.

Tactic d) Encourage use of buffer strips by educating riparian landowners about programs like CRP and CREP.

Tactic e) Support Department Law Enforcement and environmental regulatory staff in enforcement actions for violation of laws relating to water pollution, storm water runoff and water and shoreline protection.

Tactic f) Encourage highway departments to take steps to reduce sediment runoff resulting from roadside ditch maintenance.

Problem 3. Dams and other waterway alterations limit the movement of fish in rivers and can degrade habitat.

Most major Lake Michigan tributaries have been dammed (if the Besadny Fisheries Facility on the Kewaunee River is counted as a dam, all tributaries have been dammed). These dams restrict both upstream and downstream movement of fish. The dams can benefit fisheries by preventing sea lamprey from reaching suitable spawning habitat and limiting upstream migrations of other detrimental species, but they can have major negative effects. They can restrict access of many native species to large areas of spawning and nursery habitat and divide populations into genetically isolated sub-populations. The native species affected can include smallmouth bass, walleye, musky, northern pike, lake whitefish, and lake sturgeon. Blockage of the upstream migration for anadromous fish also limits stream fishing opportunities. The Department through the Bureau of Water Regulation and Zoning regulates alterations of waterways for other purposes. Some old dams do not stop the upstream passage of anadromous fish, but angling for those fish is regulated by inland rules that include a closed winter season.

Tactic a) Encourage the removal of obsolete and other selected dams and look for methods for passing migratory species around dams.

Tactic b) Continue to advise Water Regulations and Zoning staff and local zoning agencies about fishery impacts from waterway alterations.

Tactic c) Restore in-stream habitat after dam removal.

Objective B. Protect and restore native species

Human activities in the Lake Michigan basin, through water quality degradation, habitat modification, intentional and unintentional introduction of non-indigenous species, and sport and commercial fishing, have had profound effects on native fish populations. The Lake Michigan system as a whole has been sufficiently altered that it is not feasible to completely restore the pre-settlement native fish community. However, rehabilitation of populations of some native species could promote diversity and stability within the ecosystem, while also, in some cases, providing additional sport or commercial opportunities.

Problem 1. Natural walleye recruitment does not sustain acceptable fisheries in the Milwaukee River and Harbor.

In an effort to improve the near-shore fishery in the Lower Milwaukee River, fry and fingerlings of native species including walleye, northern pike and smallmouth bass were stocked since the mid 1980s. Fry stocking yielded only marginal results. In the mid 1990s, when the yellow perch population in Lake Michigan declined dramatically, the interest in improving populations of alternate near-shore species grew much stronger in the local fishing community. With the initial financial support from the Lakeridge and Lakeshore sportfishing clubs, the Department in 1995 embarked on a pilot project of raising and stocking 10,000 extended growth walleye annually in the lower Milwaukee River. A detailed plan of walleye population restoration in the lower Milwaukee River and harbor was developed in 1998[4]. The main objective of the program was to re-establish self-sustaining populations. The plan also included marking each fish in order to identify the year of stocking and evaluate their performance of each year class. In addition, a radio telemetry study was incorporated to examine movement patterns of adult walleye. The growth rate of the stocked walleye has been well above average compared to other walleye populations in the state. Anglers are now targeting walleye, with good seasonal catches documented. Catch-and-release has played a big part of the success of the program. No natural reproduction of walleye has been documented to date primarily because of variable stocking rates over the course of the 7-year plan[5].

Tactic a) Stock 10,000 extended growth Great Lakes strain walleye or 30,000 fingerlings annually from 2005 – 2009.

Tactic b) Use extended growth walleye fingerlings, when available, for stocking in the Milwaukee River.

Tactic c) Continue to mark each year-class with a specific finclip.

Objective C. Maintain and develop current fisheries assessments

Fisheries assessments are one of the best tools for fisheries management to understand the populations of fish in a given area. These tools range from young-of-the-year assessments using trawls and seines to adult and spawning populations using fyke nets and electrofishing equipment. To accurately manage a fishery, these assessment tools must be used and modified.

Problem 1. The majority of walleye harvest occurs at night, hours not covered by the existing creel survey.

The Lake Michigan Creel survey conducted by the Department is one of the most comprehensive surveys in the United States. This survey runs from mid March to October and covers fishing from Kenosha to Marinette. However, due to cost constraints the survey is limited to daytime hours. Inland creel surveys that are tailored for walleye harvest are usually conducted at night when most walleyes are caught. A similar effort is needed in the Milwaukee estuary to more accurately estimate the walleye harvest.

[4] WDNR 1998. An assessment of the impact of stocked walleye on stocked salmon in the Milwaukee estuary. Unpublished report available from the Bureau of Fisheries Management and Habitat Protection. 17p.

[5] WDNR 2004. An Evaluation of Walleye Population Restoration Efforts in the Lower Milwaukee River and Harbor, Wisconsin, 1995 – 2003. Bureau of Fisheries Management and Habitat Protection. PUB-FH-510-2004. 23p.

Tactic a) Investigate if the current creel survey can be modified to include some nighttime or winter fishing hours.
Tactic b) Initiate a night creel survey, if possible, with existing funding.

Problem 2. More information on walleye life history patterns are needed.

Walleye life history information in the Milwaukee Estuary is limited but expanding each year as assessments are conducted on a variety of life stages. These assessments form the backbone for the management of walleye in this system. Efforts to maintain and even expand these assessments are warranted so that critical information needed to maintain the balance between native and introduced species is maintained.

Tactic a) Conduct spring walleye population assessment.
Tactic b) Conduct walleye spawning assessment.
Tactic c) Conduct young-of-the-year larvae survey.
Tactic d) Conduct fall fingerling survey.

Objective D. Maintain and enhance salmon and trout populations in Lake Michigan

Sport fishing in Wisconsin's waters of Lake Michigan has been great the past three years and outstanding for chinook salmon. Management activities including chinook salmon stocking reductions, improved hatchery practices, declining incidence of bacterial kidney disease, healthy alewife population, etc. have lead to the high estimated harvest of chinook salmon detected since 2002. Target levels of harvest have been established in the Lake Michigan Integrated Fisheries Management Plan 2003 – 2013 and are listed below for the six salmon and trout species currently stocked in Lake Michigan.

We will continue to sustain this fishery through a stocking program similar to that employed in recent years. The distribution of stocked salmon and trout other than lake trout along the Wisconsin shoreline has been determined primarily in consideration of catch data, previous stocking patterns, and the distribution of fishery access facilities (i.e., ramps, moorings, piers, shoreline, and streams)[5].

Estimated annual sport harvest of salmon and trout from Wisconsin waters of Lake Michigan during 1992 through 2001 and target ranges for the next five years.

	1992– 2001 harvest average	target range	
		Low	high
brook trout & splake	1,867	1,000	5,000
brown trout	43,141	25,000	65,000
rainbow trout	92,797	70,000	120,000
chinook salmon	138,932	85,000	190,000
coho salmon	81,487	50,000	140,000
lake trout	52,573	30,000	82,000

Problem 1. Accurate sport harvest estimates are needed.

Our knowledge of sport harvests is based on creel surveys funded largely from the sale of Great Lakes Salmon and Trout Stamps and on reports submitted by charter captains. Creel surveys provide needed information about numbers of fish harvested, movements of marked fish, growth and fitness of harvested fish, extent of natural

[5] Krueger, C.C. and T.R. Dehring. 1986. A procedure to allocate the annual stocking of salmonids in the Wisconsin waters of Lake Michigan. Fish Management Report 127, Bureau of Fish Management, Wisconsin Department of Natural Resources. Madison, WI.

reproduction, and angler effort. They can also be used to collect data related to special studies or management questions. Recognizing that states differ in creel survey methods, the Creel Task Group of the Lake Michigan Technical Committee compared creel surveys in the four states and issued recommendations in 1995. The Wisconsin creel survey was considered well designed. All recommendations to improve Wisconsin's survey have been implemented. The Creel Task Group recommended that all states annually provide a standardized set of data to a lakewide creel survey database. Wisconsin has consistently submitted data to the GLFC for this purpose, but no lakewide synthesis has occurred.

Tactic a) Continue conducting sportfishing creel surveys.
Tactic b) Expand the creel survey to assess winter and spring brown trout, brook trout and splake harvest and effort.
Tactic c) Encourage synthesis of lakewide creel results.

Problem 2. Current salmon and trout stocking quotas are annually adjusted

The current salmon and trout sport fishery in Lake Michigan, and particularly in Wisconsin's waters, is almost entirely dependent on artificial fish propagation and stocking. Since the stocking of salmon and trout was implemented on a large scale, one new hatchery (Kettle Moraine Springs) and two egg-collection facilities (one on the Kewaunee River and one on the Root River) have been added to the Department's Lake Michigan cold-water propagation system. The Department has also acquired the former USFWS hatchery at Lake Mills, which produces both coolwater fish (walleye, northern pike, smallmouth bass) for inland stocking and, currently, coho salmon for Lake Michigan. The remainder of the substantial increase in the number and pounds of trout and salmon required to meet Lake Michigan stocking quotas has been produced by the existing facilities to the point of overcrowding their rearing capacity, with a subsequent reduction in the quality of the fish produced. These problems have been compounded by increased space needs for the inland feral (wild) trout program, the evaluation of two new strains of rainbow trout for Lake Michigan and reductions in rearing capacity due to facility maintenance needs. Closures of two of the Department's hatcheries (Hayward and Crystal Springs) in the early 1980s because of funding shortfalls have added to the strain of the propagation system.

Tactic a) Help clarify and document the need for improved facilities.
Tactic b) Identify a facility for near-shore captive broodstock.
Tactic c) Seek an increase in the Great Lakes Trout and Salmon Stamp and Two-day Sports Fishing License prices to help pay for Great Lakes hatchery renovations.
Tactic d) Seek a license fee surcharge to support hatchery renovations.
Tactic e) Seek an increase in the patron license reimbursement to the Great Lakes Trout and Salmon Stamp fund.
Tactic f) Continue to seek funding for the Wild Rose State Fish Hatchery Renovation.

Problem 3. Fish species desired by anglers in Lake Michigan and its tributaries may be limited by habitat and may conflict with other management objectives.

In the lower reaches of some tributary streams the amount of available habitat has increased because of improvements in water quality and the removal of dams. With the removal of the North Avenue Dam in Milwaukee smallmouth bass have thrived and northern pike are also doing well. Additionally, in the Milwaukee River a number

of mature walleye can be found. However, the lower reaches of most Lake Michigan tributaries provide limited habitat for these species, so only small increases in harvest opportunities can be expected.

Moreover, the Department is concerned about the impact of smallmouth bass, walleye, and northern pike on salmon and trout. Currently, many of Wisconsin's Lake Michigan tributary streams are seasonally managed for those anadromous cold-water species. Those rivers not only are host to returning adult fish, but also are the sites of stocking of thousands of fingerlings and yearlings. To mitigate this problem in the Milwaukee River, the Department has worked with the Milwaukee Great Lake Sport Fishermen to deploy net rearing pens outside the mouth of the river, where young chinook salmon can be held prior to release.

Tactic a) Survey and describe existing habitat (habitat needed by walleyes, northern pike, smallmouth bass, yellow perch, and muskies, etc.), and describe what each location can support.

Tactic b) Assess impacts of enhanced populations on other species on a biennial basis.

Tactic c) Continue to stock limited numbers of walleyes in the Milwaukee River and assess potential impacts of a walleye stocking program on salmonid species.

Tactic d) Continue to work with private groups to supplement rearing costs, deploy net pens, and meet other project needs.

APPENDIX A
Executive Summary from
An Evaluation of Walleye Population Restoration Efforts in the Lower Milwaukee River and Harbor, Wisconsin, 1995-2003. PUB-FH-510-2004

With the removal of the North Avenue Dam on the lower Milwaukee River in 1990 several miles of upstream waters were made available to migratory as well as resident species whose movements were restricted until then by the Dam. In addition, WDNR implemented some major habitat improvement activities in the formerly impounded area in 1997. Surveys indicated many new fish species recolonizing the area as the water quality and habitat progressively improved. This project was aimed at attempting to reintroduce walleye (*Sander vitreus*), one of the native species in the Milwaukee River system, which became insignificant due to Damming and poor habitat conditions. Additionally, it was envisioned as an alternate source of nearshore fishing due to a declining yellow perch population.

Approximately 10,000 extended growth Great Lakes strain walleye fingerlings were stocked annually since 1995 in the Lower Milwaukee River downstream of the former North Avenue Dam. The fish were individually marked to identify their year-class either by a single finclip or by using a Visible Implant Elastomer (VIE) mark. Predation impact, if any, caused by walleye on stocked salmonid smolts was monitored each year soon after releasing the salmon smolts by capturing and analyzing stomach content of the predators. Considerably higher predation impact was noticed in 1996 and 1997 during the first ten days post-stocking. Based on this information, the stocking location for Chinook salmon (*Oncorhynchus tshawytscha*) smolts was relocated to McKinley Marina, several miles away from the location of walleye stocking. This change eliminated the loss of Chinook salmon smolts due to predation immediately following stocking. A net pen was also used to acclimate the salmon smolts to the lake water by holding them over night in the marina water.

A comparison of growth and survival rates between the walleye marked with two different marking techniques (finclip vs. VIE) did not show any significant differences. A cost benefit analysis indicated no obvious benefits using elastomer marking. VIE marks were detectable in walleye as old as 5 years, however, the retention rate appeared to decrease with age.

In general, growth rates of these walleye were greater than statewide average growth rate for walleye populations (average growth rate of 100mm per year in the first three years in the Milwaukee harbor). Mature and spent walleye were recorded during spring spawning assessments beginning in 1998. However, we have not yet documented successful natural reproduction in the system. Population size estimated based on all age groups of walleye varied from year to year, the most recent estimate in 2003 ranged from 401 to 2388.

Radiotelemetry technology was used to track movement by surgically implanting a radiotransmitter into the body cavity of walleye. The data indicated a distinct seasonal movement pattern by the adult walleye according to water temperature and food availability. During the summer they moved from the rivers to cooler and deeper harbor waters. In winter they moved to the warmer waters in the Menomonee River canals which receive warm water discharges from a nearby power plant. There is a significant angling effort targeted towards walleye in recent years along the Menomonee River canals, Summerfest lagoon and in the Milwaukee River upstream of the former North Avenue Dam to Kletzsch Park. Most of the anglers practice catch-and-release.